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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/761,654 | 01/20/2004 | Shiu-Ko Jangjian | 67,200-1200 | 3382 |

7590 09/12/2005
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EXAMINER

KORNAKOV, MICHAEL

ART UNIT PAPER NUMBER

1746

DATE MAILED: 09/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/761,654

Applicant(s)

JANGJIAN ET AL.

Examiner

Michael Kornakov

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 01 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 July 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Applicants' amendment, dated 07/01/2005, is acknowledged. Objections to drawings are withdrawn in view of submitted corrections. Claims 1, 9, 13 are amended. Claims 1-20 are pending and examined on the merits.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 3, 9, 13, 15, 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Nguyen et al (U.S. 6,569,257).

Nguyen teaches a method of cleaning a process chamber comprising the steps of providing into the chamber a gas mixture, which includes N₂O and NF₃ in volume ratios corresponding to the claimed values; maintaining a chamber temperature within the range of about 65°C to about 300°C; generating a plasma from said gas mixture by applying RF power of about 1 Watt/cm² to about 20 Watts/cm² (col.5, lines 50-63; paragraph, bridging col.5 and 6; col.7, lines 11-44). Therefore all the limitations of the instant claims are met by Nguyen.

4. Claims 2, 4-8, 10-12, 14, 16, 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al (U.S. 6,569,257) in view of San et al (U.S. 6,767,836).

While teaching a method of cleaning a process chamber with the steps identical

Art Unit: 1746

to those instantly claimed, Nguyen does not specifically indicate the step of providing an inert carrier gas in the gas mixture. However, inert carriers are conventionally utilized in gaseous cleaning compositions in order to stabilize cleaning plasmas. Thus, San teaches similar chamber plasma cleaning process, wherein in order to enhance plasma stability Ar or He are included in $\text{NF}_3/\text{N}_2\text{O}$ gaseous cleaning mixture. Therefore, one skilled in the art motivated by San would have found obvious to add Ar or He to the gaseous mixture of $\text{N}_2\text{O}/\text{NF}_3$ in order to enhance plasma stability in the teaching of Nguyen and thus to arrive at the limitations as instantly claimed.

5. Claims 1-4, 9,10,13-18 are rejected under 35 U.S.C. 102(b) as being unpatentable over Pang et al (U.S. 2001/0016674).

Pang teaches a method of cleaning a CVD process chamber, which includes introducing a gaseous mixture formed from NF_3 , N_2O and N_2 gases into the process chamber and generating a plasma from said gaseous mixture. The indicated volume ratio of NF_3 to N_2O is approximately 5:2. The chamber is maintained at a temperature of 400°C . Plasma formation is achieved with RF power supply powered at 1000 Watts [0084].

The teaching of Pang remains silent about the volume ratio of at least about 0.8. However, it is noted here that the volume ratio between ingredients of gaseous mixture may vary according to the particular process chamber and nature of deposits to be removed. The volume ratio also affects the amount of oxygen and fluorine containing species, the variation of which in plasma cleaning environment optimizes conditions for

Art Unit: 1746

the removal of certain residues and, therefore, optimizing the volume ratio is within the skills of ordinary skilled in the art and would have been obvious.

Pang does not specifically indicate maintaining a chamber temperature from about 65°C to about 300°C. However, it is noted here that the processing temperature is result effective parameter, because it affects cleaning efficiency and formation/recombination of plasma species. Therefore, variation and establishing the particular processing temperature is within the skills of ordinary skilled in the art and would have been obvious.

Pang does not indicate the size/volume of the chamber and therefore RF power being from 1 watt/cm² to about 20 watts/cm² is not specifically indicated in the teaching of Pang. However, Pang teaches that the actual power level selected should be determined by balancing a desire to use a high power level to form an intense plasma and a desire to use a low power level to save energy costs and allow use of smaller, less expensive power supplies [0043], thus indicating that RF power is result effective parameter, optimizing of which is within the skills of ordinary skilled in the art.

It is noted here that the criticality of the instantly recited processing parameters is not shown on this record and therefore optimizing of such parameters would be obvious.

6. Claims 5-8, 11, 12, 19, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pang et al (U.S. 2001/0016674) in view of Shang et al (U.S. 5,788,778).

Art Unit: 1746

While teaching the use of N₂ as the carrier gas, Pang does not specifically indicate the use of Ar and/or He. However, N₂ or Ar or He are equally used in the art as carrier gases in order to assist in chamber cleaning processes, as indicated by Shang (col.5, lines 3-8). Therefore, one skilled in the art motivated by the disclosure of Shang would have found obvious to utilize Ar or He as equal substitutes of N₂ in the teaching of Pang with the reasonable expectation of success. Furthermore, substitution of equivalent methods requires no express motivation, as long as the prior art recognizes equivalency, *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. V. Linde Air products Co.* 85 USPQ 328 (USSC 1950).

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

Regarding Applicants' statement that the reference to Pang fails to provide any indication that carrying out a plasma cleaning process having the parameters recited in amended claims would likely be successful, it is noted here that such statement is apparently without merits, because Pang specifically indicates that "also the present invention has been described in some detail by way of **illustration and example** for purposes of clarity and understanding, it will be obvious that certain changes and

Art Unit: 1746

modifications may be practiced...and are intended to be included within the scope of the present invention" [0093], thus clearly providing for rationale "obvious to try".

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1746

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "M. Kornakov", with a stylized flourish at the end.

Michael Kornakov
Primary Examiner
Art Unit 1746

09/08/2005